



Late effects of cancer treatments: overview

Cancer treatments can cause long-term and late effects. Long term effects such as fatigue, cognitive problems, peripheral neuropathy and lymphoedema may happen during or soon after treatment finishes. Late effects such as cardiac and pulmonary problems or neurological effects may appear months to years after the completion of treatment.

Late effects may:

- be system specific, related for example to organ damage, immunosuppression or endocrine damage
- include further cancer: recurrence of the original cancer that was treated, increased risk of a particular cancer due to the same factor/s that caused the original cancer, or increased risk of a cancer due to cancer treatment
- include functional changes relating to treatment (e.g. incontinence due to pelvic radiation, lymphoedema due to surgery, side effects of ostomies, fractures due to reduced bone density caused by a drug treatment).

The risk of late effects is related to the age of the patient, the type of cancer, the types of treatment they received, pre-existing illnesses, etc. For guidance on potential late effects following specific treatments, see Late Effects of Cancer Treatment: Screening and Surveillance Guidelines for GPs by the Late Effects Service at Peter MacCallum Cancer Centre

Late effects of cancer treatments can include:

- Fatigue
- Cardiac and pulmonary effects
- Neurological effects including Chemo-brain
- Endocrinological
- Genitourinary effects
- Peripheral neuropathy
- Malignant neoplasms and second cancers
- Lymphoedema
- Sexual dysfunction
- Pain
- Other effects

Descriptions of some late effects

Fatigue

Fatigue is a common effect of cancer treatment. It can severely disrupt survivors' lives. It may be an effect of disease- or treatment-related anaemia, infection, cytokine release or sleep disorder, or there may be other, as-yet-unknown, associations.

Survivors may benefit from advice on conserving energy; exercise programs that will improve fitness, flexibility and strength; and reassurance that exercise appropriate to their condition will be beneficial rather than harmful.

Cardiac and pulmonary effects

Some cancer survivors have an increased incidence of cardiac and/or pulmonary dysfunction. Effects may appear within months or years of treatment.

Cardiac late effects are associated with use of some chemotherapy agents and therapeutic irradiation. It is thought that people who have reduced cardiac function within six months of completing

chemotherapy are at increased risk for the development of late cardiac failure.

Some chemotherapy agents, as well as therapeutic irradiation, lung surgery and bone marrow/stem cell transplantation can have later pulmonary effects. The severity of symptoms depends on the injury and the degree of tissue repair. Aggressive lung cancer treatments that combine surgery, radiation and chemotherapy may put survivors at high risk for symptoms.

Survivors at risk may need periodic evaluation of cardiac and pulmonary function. Advise on smoking and other lifestyle factors that may cause cardiac or pulmonary dysfunction. Survivors may avoid exercising because of symptoms. It may be helpful to assure the patient that an exercise program tailored to their condition will be beneficial rather than harmful.

Key messages

- Cancer treatments may cause long-lasting side effects, called late effects.
- The risk of late effects is related to the age of the patient, the type of cancer, the types of treatment they received, pre-existing illnesses, etc.
- All cancer survivors should receive follow-up care after treatment to monitor and manage any late effects.



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Neurological effects

Neurocognitive and neuropsychological effects are associated with whole-brain irradiation and/or treatment with some high-dose systemic or intrathecal chemotherapy agents. Effects may appear months or years after treatment. Some long-term survivors who were treated with whole-brain irradiation with or without chemotherapy develop progressive dementia and dysfunction. Surgery, chemotherapy and biologic response modifiers may also cause cognitive effects.

'Chemo-brain'

The phrase chemo-brain was first used after women treated for breast cancer described changes in memory and concentration. Cognitive problems have since been observed in people who have had cancer but who have never had chemotherapy. Cancer survivors may have impaired verbal and complex information processing, and impaired concentration and visual memory. The association with treatment is not well understood and more studies are being done to better understand it.

Endocrinological effects

Chemotherapy and therapeutic irradiation may impair growth and result in obesity among some survivors of childhood cancer. Gonadal dysfunction and infertility in men and women (incl. premature menopause in women) may be associated with use of:

- some chemotherapy agents
- hormone treatment
- therapeutic irradiation for childhood cancers and affecting gonads in adults
- bilateral retroperitoneal lymph node dissection in men.

Genetic disease and congenital abnormalities in offspring are possible.

Infertility may be transient (esp. in men) or permanent.

Referral to an endocrinologist specialising in such effects may be helpful.

Genitourinary effects

Chemotherapy can lead to glomerular and tubular injury. Radiotherapy with and without chemotherapy may cause tubular damage.

Peripheral neuropathy

Some chemotherapy drugs can damage peripheral nerves. People may have tingling and numbness in their hands and feet years after the end of treatment. A treatment plan that includes medications, physical and occupational therapy may be beneficial.

Malignant neoplasms and recurrence

There is generally some risk of recurrence of the primary cancer. In some cases a second cancer can arise as an effect of the treatment for the original cancer. See our fact sheet: Follow-up after primary therapy for more details and advice..

Lymphoedema

This can be caused by lymph node dissection and high-dose radiotherapy to the lymph nodes.

The survivor may benefit from advice about prevention and treatments such as massage and exercise. Referral to a lymphoedema support group may also be useful.

Sexual dysfunction

This may be disease- or treatment-related (e.g. body image concerns, erectile dysfunction related to prostate surgery or radiotherapy).

Medical treatment for erectile dysfunction may be helpful to men. Counselling may be useful for both women and men.

Pain

Pain can be related to amputation (phantom limb pain), radiotherapy-caused scarring and or incision. Pain can usually be treated.

Other

Other effects may include, but are not limited to:

- increased risk of infection (e.g. associated with splenectomy, amputation, nephrectomy)
- bone effects (such as growth impairment, osteonecrosis, fracture) (e.g. associated with some chemotherapy agents)
- dental problems (e.g. associated with radiotherapy to the head and neck)
- incontinence (e.g. associated with prostate cancer surgery and radiotherapy)
- bowel effects (e.g. associated with surgery to the bowel and uterus and radiotherapy to pelvic area)

- thyroid effects (e.g. associated with radiotherapy of the neck)
- hepatic effects (e.g. chemotherapy and radiotherapy to the upper abdomen can damage the liver)
- cataracts (e.g. associated with radiotherapy and chemotherapy)
- anxiety, depression and mood swings.

This information sheet is part of a series designed for health professionals.

Review the rest of the series on our website: www.petermac.org/education/survivorship-education

If you are a cancer survivor please also see our matching series written specifically for you: <https://www.petermac.org/services/support-services/australian-cancer-survivorship-centre/cancer-survivors>

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Further information

This overview was prepared with reference to:



Brennan M, Jefford M 2009. General practitioner-based models of post-treatment follow up. *Cancer Forum* 33(3).

Also see:



National Cancer Institute: PDQ® Late Effects of Treatment for Childhood Cancer. Bethesda, MD: National Cancer Institute. Date last modified 27/10/2014. Available from the NCI website.



National Cancer Institute (NCI) 2010. Late effects of treatment for childhood cancer. Available from the NCI website (US).